

## **BOX END OF WRENCH**

### **FIELD OF THE INVENTION**

The present invention relates to wrench having a box end which includes a plain inner surface and allows the box end to be rotated regardless  
5 of the nut in the box end.

### **BACKGROUND OF THE INVENTION**

A conventional wrench having a box end is used for a long time and the box end has a polygonal inner periphery so that an object such as a nut or a screw head can be engaged with the polygonal inner periphery and  
10 rotated with the wrench. An inherent shortcoming of the conventional box end wrench is that the box end has to be removed from the nut after being rotated an angle and re-cap to the nut at desired position. This shortcoming is more obvious when other objects are located close to the nut and the user is suffered by the repeated actions of removing the box end from the nut and  
15 re-mounting the box end to the nut.

The present invention intends to provide a wrench, especially to a box end of a wrench wherein a plain surface is defined in an end of the inner periphery of the box end and a spring member is engaged with the box end so that the wrench can be freely rotated regardless of the object when the  
20 object is located in the position enclosed by the plain surface.

### **SUMMARY OF THE INVENTION**

The present invention relates to a wrench that comprises a handle and a box end is connected to the handle. The box end has a through hole

and a polygonal inner periphery is defined in an inner periphery of the through hole and located close to a first side of the box end. A plain inner surface is defined in the inner periphery of the through hole and located close to the second side of the box end. An inner diameter of the plain inner periphery is larger than an inner diameter of the polygonal inner periphery. A spring member is engaged with the through hole of the box end and enclosed by the polygonal inner periphery.

The present invention will become more obvious from the following description when taken in connection with the accompanying drawings which show, for purposes of illustration only, a preferred embodiment in accordance with the present invention.

### **BRIEF DESCRIPTION OF THE DRAWINGS**

Fig. 1 is a perspective view to show the box end of the wrench of the present invention;

Fig. 2 is an exploded view to show a spring member and the wrench of the present invention;

Fig. 3 is a perspective view to show the wrench having the box end of the present invention;

Fig. 4 is a perspective view, the wall of the box end partially removed, of the box end and the spring member in the box end;

Fig. 5 is a cross sectional view to show the spring member in the box end;

Fig. 6 shows a bolt head is engaged with the polygonal inner periphery of the box end by compressing the spring member;

Fig. 7 shows the bolt head is engaged with the plain inner surface of the box end;

5            Fig. 8 shows a cross sectional view of the engagement disclosed in Fig. 6;

Fig. 9 shows a cross sectional view of the engagement disclosed in Fig. 7;

10           Fig. 10 shows a bead and a spring is engaged with the passage of the box end;

Fig. 11 shows the bead is forced backward into the passage when the bolt head is biased to the second side of the box end;

Fig. 12 shows another embodiment of the spring member and the box end of the wrench;

15           Fig. 13 is a perspective view to show the spring member in Fig. 12 is engaged with the through hole of the box end;

Fig. 14 is a cross sectional view which shows that the bolt head compresses the spring member and is engaged with the polygonal inner periphery of the box end;

20           Fig. 15 is a cross sectional view which shows that the bolt head is rotatably enclosed by the plain inner surface of the box end;

Fig. 16 shows the spring member has a flat rectangular cross section, and

Fig. 17 shows the end of the spring member is a flat end.

### **DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT**

Referring to Figs. 1 to 5, the wrench of the present invention comprises a handle 10 and a box end 11 is connected to the handle 10. The  
5 box end 11 has a through hole and a first side and a second side. A polygonal inner periphery 12 is defined in an inner periphery of the through hole and located close to the first side of the box end 11. A plain inner surface 13 is defined in the inner periphery of the through hole and located close to the second side of the box end 11. An inner diameter of the plain inner periphery  
10 13 is larger than an inner diameter of the polygonal inner periphery 12. A groove 14 is defined in the polygonal inner periphery 12 and extends less than 360 degrees.

A spring member 15 is a coil spring and includes a first end and a second end. The first end of the spring member 15 is engaged with the  
15 groove 14 and the spring member 15 is enclosed by the polygonal inner periphery 12. As shown in Fig. 17, the body 153 of the spring member 15 has a flat rectangular cross section and the first end 154 of the spring member 15 has a circular cross section so as to be easily engaged with the groove 14.

20 Referring to Figs. 6 to 9, when the box end 11 is mounted to a bolt head 21 of a bolt 20 from the second side of the box end 11, when pressing the box end to let the bolt head 21 compress the spring member 15, the bolt head 21 is engaged with the polygonal inner periphery 12 so that the bolt 20

can be rotated by the wrench. When releasing the pressing force, the spring member 15 pushes the bolt head 21 and the wrench is raised and the bolt head 21 is enclosed by the plain inner surface 13. At this position, because the bolt head 21 is not clamped by the box end 11 so that the box end 11 can be  
5 freely rotated regardless of the bolt head 21.

Referring to Figs. 10 and 11, a passage 16 is defined through a wall of the box end 11 and communicates with the through hole. An opening is defined in the plain inner surface 13 by the passage 16. An index assembly 17 including a bead 19 and a spring 18 is received in the passage  
10 16. The bead 19 partially extends into the through hole via the opening, so that when the bolt head 21 is moved to the position in Fig. 11, the user hears a click sound when the bolt head 21 passes through the bead 19.

Referring to Figs. 12 to 15, the spring member can be a collar 151 and a plurality of flexible plates 152 extending inclinedly from an inner  
15 periphery of the collar 151. An annular groove 14 is defined in the inner periphery of the through hole and the collar 151 is engaged with the groove 14. The bolt head 21 may push the flexible plates 152 and is engaged with the polygonal inner periphery 12 of the box end 11. The flexible plates 152 may push the bolt head 21 as shown in Fig. 15.

20 While we have shown and described the embodiment in accordance with the present invention, it should be clear to those skilled in the art that further embodiments may be made without departing from the scope of the present invention.